treatment with alternating periods of rest must be kept up for a period of two or three years in order to insure against relapse. Even then it is important that the patient remain under observation of the physician for a period of years, reporting at stated intervals for examinations and tests. Owing to the importance of early treatment and of thorough treatment for syphilis, it is desired to especially emphasize these two points to the end that people who become infected may seek treatment early and may remain under treatment for a sufficient period of time to insure permanent results.

In conclusion it has been shown that syphilis is an important, though not accurately measured, factor in the waste of infant life, especially before birth and during the first month after birth. This king among diseases that ranks with tuberculosis as a cause of death is unique in the destructive force it carries to the next generation with such havoc to unborn and new-born children. If the germ plasm of the race is to be protected against its ravages, it is necessary to direct attention toward the prevention of syphilis. The prevention of the unnecessary waste of infant life caused by syphilis is possible only by limiting the prevalence of the disease itself. Since syphilis is spread chiefly by adults, it follows that the prevention of syphilis among infants and children requires that syphilis be prevented among adults. Attention must be given to the adult carrier. The essential elements in the program of prevention are the early diagnosis and the vigorous treatment of existing cases extended for a sufficient length of time to insure against relapse. In order that unfortunate victims of the disease may be led to seek early treatment, and to continue treatment sufficiently long, there must be a widespread diffusion of information concerning the necessity for such early and prolonged treatment for the protection of both the victim and his offspring.

ANTITYPHOID VACCINATION.[1]

By THOMAS G. HULL, Ph. D., Chief Division of Laboratories, Illinois State Department of Public Health.

It is quite a well-known fact that one attack of typhoid fever usually renders an individual immune to subsequent attacks of the disease. Advantage is taken of this phenomenon by injecting dead typhoid bacilli into well persons, thus setting up within the body a series of processes not unlike those which take place in an attack of typhoid fever, but without the attending discomfort and danger of the disease itself. This is antityphoid vaccination. The process is harmlesss since the injected typhoid bacteria are dead; the immunity established, while not as great nor as lasting as that raised by an

[1] This article originally appeared in the Illinois Health News for August, 1921, and is reprinted here by permission.

attack of the disease, is sufficient to protect an individual for a considerable period of time. At present a full prophylactic treatment usually consists of three small doses administered a week apart. Formerly typhoid bacilli alone were in the vaccine, but of late it has been customary to include the closely related paratyphoid organisms, thus protecting against three diseases instead of one disease.

Typhoid vaccination was first put to practical application on a large scale in the United States Army.

Table I, given by Maj. Lister, shows how, by voluntary vaccination, the disease in the Army was reduced 70 per cent, and by compulsory vaccination was well-nigh eliminated.

TABLE I.—*Vaccination against typhoid in United States Army.*

Year.		Persons vaccinated.	Cases of typhoid.
1908	Voluntary	0	239
1909	do	830	282
1910	do	16,093	198
1911	do	27,720	70
1912	Compulsory	40,057	27
1913	do	25,086	4
1914	do	36,902	7

The death rate from typhoid in the Army before vaccination was instituted averaged about the same as that in the same age group (20 to 29 years) in civil life. Col. Russell has compiled figures showing the decided drop in the Army death rate after vaccination was instituted, and a much smaller decline in the civil death rate (a decline due to improved sanitation).

TABLE II.—*Rate of typhoid fever in the Army and in the corresponding age group in civil life.*

Year.	Death rate per 1,000 in Army.	Death rate per 1,000 in civil life (ages 20 to 29 years).	Year.	Death rate per 1,000 in Army.	Death rate per 1,000 in civil life (ages 20 to 29 years).
1900	0.43	0.46	1910	0.16	0.27
1901	.64	.42	1911 [b]	.09	.23
1902	.86	.40	1912	.04	.18
1903	.28	.35	1913	.00	.18
1904	.27	.33	1914	.03	.15
1905	.30	.32	1915	.00	.18
1906	.28	.32	1916	.03	.12
1907	.19	.28	1917	.03	.11
1908	.23	.28	1918	.05	.09
1909 [a]	.28	.23			

[a] Voluntary vaccination against typhoid in Army.
[b] Compulsory vaccination against typhoid in Army.

In the last 10 years typhoid vaccination has been put to many severe tests, but it has never failed to show its value. For various causes, which will not be discussed here, vaccination is not an absolute preventive against typhoid fever. Massive and repeated doses of

typhoid organisms may break down the defense of the individual, but his vaccination even then may render the course of the disease much milder. This was well illustrated in Hawaii in 1917, in an epidemic where only part of the troops were vaccinated. Only 1.3 per cent of the vaccinated troops contracted typhoid, while 5.5 per cent of the unvaccinated troops came down with the disease. Of the sick vaccinated, 1 in 13 died, whereas of the sick unvaccinated 1 in 8 died.

TABLE III.—*Typhoid epidemic in Hawaii in the fall of 1917.*

Troops.	Case rate per 1,000.	Death rate per 1,000.
Vaccinated	13.45	0.97
Unvaccinated	55.41	8.62

In the World War elaborate sanitary precautions, unknown in other wars, were instituted to prevent any opportunity for men to become infected with typhoid. In the stress of the struggle, however, there were many breaks in the defense, and plenty of opportunities were afforded for what under ordinary conditions would have been large epidemics. Thanks to vaccination, these did not develop, or, at most, produced but a few cases each. Out of the 4,000,000 troops in the World War, there occurred 213 deaths from typhoid. If the rates in previous wars had obtained, this figure would have been multiplied several hundred times.

TABLE IV.—*Relation of mortality from typhoid fever in the World War to that of previous wars.*

Deaths from typhoid fever in the World War	213
Deaths that would have occurred if Civil War rate had obtained	51,133
Deaths that would have occurred if Spanish War rate had obtained	68,164

General vaccination against typhoid fever in civil life has not been practiced on a sufficiently large scale and records have not been kept sufficiently accurate to permit the drawing of definite conclusions. It would be expected, however, that the several millions of men in the Army who were vaccinated would show a lowered typhoid rate over prewar rates for the same age group. This is exactly what happened. While white women in the age group 20 to 35 years showed a decrease of 47 per cent in 1919 over the 1911–1916 average, white men in the same age group showed a decrease in 1919 of 64 per cent over the prewar average.

TABLE V.—*Reduction of typhoid rate in ex-service men over prewar rates.*

	Typhoid rate, 1911–1916.	Typhoid rate, 1919.	Per cent decrease.
White men, 20–35 years	22.3	8.0	64
White women, 20–35 years	14.9	7.9	47

That the vaccination received in the Army had a distinct protective power even two or three years later, when the men had returned to civil life, was clearly shown recently in a typhoid epidemic of several hundred cases in Salem, Ohio. Dr. Bunn presents figures to show that out of 210 ex-service men in Salem, only 3, or 1.4 per cent, contracted the disease, whereas out of the female population of the same age group 12.5 per cent contracted it.

TABLE VI.—*Effect of typhoid vaccination in ex-service men in typhoid epidemic in Salem, Ohio.*

	Per cent contracting typhoid.
Female population of Salem between 20 and 30 years	12.5
Ex-service men in Salem (210)	1.4

From the above data it will be realized that typhoid vaccination is of value not only in the Army, but in civil life as well. There are, however, certain groups of individuals upon whom vaccination should be especially urged as of the utmost importance. Along with instructions as to sanitary measures in crises should go instructions as to vaccination. In this group of persons are the following:

1. All nurses in hospitals while in training.
2. All traveling men and travelers who are visiting small towns and rural districts regularly.
3. All persons planning to go to the country for summer vacation.
4. All contacts with a case of typhoid fever.
5. All persons in a community where typhoid fever is epidemic or threatens to become epidemic.
6. All persons living in towns with unsafe water supplies.
7. All persons dependent upon shallow wells for water supply.

The State Department of Public Health furnishes typhoid vaccine free to all residents of the State; the only cost to the individual is that of having the vaccine administered, and his physician can administer it. During the war there was a considerable demand for vaccine in the State, due probably to an increased interest in sanitation and prophylaxis in general. During the last two years, however, this interest has fallen off as is indicated by the following figures:

TABLE VII.—*Typhoid vaccine distributed by the [Illinois] State Department of Public Health during the last four years.*

Full prophylactic treatments:	
1917–18	19,672
1918–19	16,692
1919–20	4,317
1920–21	5,431

Ex-soldiers and other persons who were vaccinated against typhoid during the war would do well to have another course of treatments at an early date.

REFERENCES.

1. Jour. Am. Med. Assoc..... 1915, *65*, 510
2. Jour. Am. Med. Assoc..... 1919, *73*, 1863
3. Idem.
4. Idem.
5. Jour. Am. Med. Assoc..... 1920, *75*, 1503
6. Jour. Am. Med. Assoc..... 1921, *76*

PRINCIPAL CAUSES OF DEATH COMPARED.

COMPARISON OF DEATH RATES FOR PRINCIPAL CAUSES, JUNE AND JULY, 1921, AND JULY AND YEAR, 1920, AND FIRST SIX MONTHS OF 1919, 1920, AND 1921.

The accompanying tables are printed from the Statistical Bulletin of the Metropolitan Life Insurance Co. for August, 1921. They present the mortality data of the industrial department of the company for June and July, 1921, and July and year, 1920, and also the death rates for principal causes among white and colored policyholders, respectively, for the first six months of the year 1921 as compared with the same periods of 1920 and 1919.

The figures are based on a strength of approximately 13,000,000 insured persons.

It is stated that the death rate for July, 1921 (7.7 per 1,000 industrial policyholders), is the lowest on record for the company, with the single exception of that for August, 1919, with a rate of 7.6.

Death rates (annual basis) per 100,000 lives exposed, for principal causes, June and July, 1921, and for July and year 1920.

[Industrial Department, Metropolitan Life Insurance Co.]

Cause of death.	Death rate per 100,000 lives exposed.			
	July, 1921.	June, 1921.	July, 1920.	Year 1920.
Total, all causes	768.5	922.2	823.0	989.4
Typhoid fever	7.2	5.3	5.6	6.7
Measles	2.9	3.1	7.5	8.5
Scarlet fever	4.6	8.0	2.7	6.0
Whooping cough	3.5	3.9	4.8	6.6
Diphtheria	13.0	19.8	12.5	22.1
Influenza	2.6	4.2	8.3	53.5
Tuberculosis (all forms)	106.3	134.3	133.7	137.9
Cancer	68.1	77.4	68.4	69.8
Meningitis (all forms)	5.2	5.6	5.7	5.2
Cerebral hemorrhage	51.1	58.9	48.7	61.3
Organic diseases of heart	98.8	120.4	101.6	117.0
Pneumonia (all forms)	28.1	55.1	34.3	106.1
Other respiratory diseases	8.8	13.9	11.5	18.2
Diarrhea and enteritis	20.7	13.6	18.2	15.8
Bright's disease	58.4	72.6	64.3	70.8
Puerperal state	16.4	20.9	19.5	23.0
Suicides	6.9	7.8	6.1	6.1
Homicides	6.2	7.6	5.4	5.8
Other external causes (excluding suicides and homicides)	75.3	67.0	73.6	60.1
Traumatism by automobile	10.4	13.9	13.6	11.1
All other causes	184.4	222.8	190.6	188.9